

PATENT
Attorney Docket
542-007-4

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Matsubara .

Serial No.: To be assigned

Filed: herewith

Title: METHOD FOR MANUFACTURING TFT ARRAY SUBSTRATE OF LIQUID
CRYSTAL DISPLAY DEVICE

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Kindly enter the following Amendment and Remarks in this
application before examination.

PRELIMINARY AMENDMENT

In the claims:

Please amend claims 4 through 14 as follows:

4. A method for manufacturing a TFT array substrate
according to claim 1 wherein a ITO film is further formed, and
through patterning to selectively remove the ITO film, the ITO
film on the source line is left to form the ITO film covering the
source line.

5. A method for manufacturing a TFT array substrate in
which as least (a) a gate insulating film, (b) a semiconductor
layer and (c) a metal layer are sequentially formed in this order

of (a), (b) and (c), and using one resist pattern formed by a photolithography, a part of the metal layer is selectively removed, to form a source line, together with the semiconductor layer beside the source line,

wherein no passivation film is formed after the formation of the source line and the removal of the semiconductor layer beside the source line.

6. A method for manufacturing a TFT array substrate according to claim 5 wherein the removal of the semiconductor layer beside the source line is accomplished such that the source line and the semiconductor layer under the source line remain exposed, and

a portion protruding beside the source line is removed from the exposed semiconductor layer under the source line through etching utilizing the source line as a mask.

7. A method for manufacturing a TFT array substrate according to Claim 5 wherein a ITO film is further formed, and through patterning to selectively remove the ITO film, the ITO film on the source line is left to form the ITO film covering the source line.

8. A method for manufacturing a TFT array substrate in which at least (a) a gate insulating film, (b) a first

semiconductor layer, (c) a second semiconductor layer and (d) a metal layer are sequentially formed in this order of (a), (b), (c) and (d), and a resist pattern comprising a region in which photoresist is removed, a region in which photoresist has a small thickness and a region in which photoresist has a great thickness is further formed by means of a photolithography,

wherein the metal layer, the second semiconductor layer and the first semiconductor layer are removed in the region in which photoresist is removed,

the metal layer and the second semiconductor layer are removed in the region in which photoresist has a small thickness,

and the metal layer, the second semiconductor layer and the first semiconductor layer are left remained in the region in which photoresist has a great thickness to form a source line with the metal layer left remained, and

wherein a region adjacent to the source line is the region in which photoresist has a small thickness, so that the metal layer and the second semiconductor layer are removed and the first semiconductor layer is left remained.

9. A method for manufacturing a TFT array substrate according to claim 8 wherein a passivation film is formed after removal of the photoresist, a resist pattern to selectively remove the passivation film is formed on the passivation film, and using the resist pattern, the passivation film above the

source line and the passivation film beside the source line are removed to, thereby, expose the second and first semiconductor layers under the source line.

10. A method for manufacturing a TFT array substrate according to Claim 8 wherein a ITO film is further formed, and through patterning to selectively remove the ITO film, the ITO film on the source line is left to form the ITO film covering the source line.

11. A method for manufacturing a TFT array substrate according to claim 9 wherein a portion protruding beside the source line is removed from the exposed second and first semiconductor layers under the source line through etching utilizing the resist pattern to selectively remove the passivation film and/or the source line as a mask.

12. A method for manufacturing a TFT array substrate according to Claim 9 wherein a portion protruding beside the source line is removed from the exposed second and first semiconductor layers under the source line through etching utilizing the selectively removed passivation film and/or the source line as a mask.

13. A method for manufacturing a TFT array substrate in which at least (a) a gate insulating film, (b) a first semiconductor layer, (c) a second semiconductor layer and (d) a metal layer are sequentially formed in this order of (a), (b), (c) and (d), and a resist pattern comprising a region in which photoresist is removed, a region in which photoresist has a small thickness and a region in which photoresist has a great thickness is further formed by means of a photolithography,

wherein the metal layer, the second semiconductor layer and the first semiconductor layer are removed in the region in which photoresist is removed,

the metal layer and the second semiconductor layer are removed in the region in which photoresist has a small thickness,

and the metal layer, the second semiconductor layer and the first semiconductor layer are left remained in the region in which photoresist has a great thickness to form a source line with the metal layer left remained,

wherein a region adjacent to the source line is the region in which photoresist has a small thickness, so that the metal layer and the second semiconductor layer are removed and the first semiconductor layer is left remained, and

wherein no passivation film is formed after removal of the resist pattern.

14. A method for manufacturing a TFT array substrate according to claim 13 wherein a portion protruding beside the source line is removed from the second and first semiconductor layers under the source line through etching utilizing the source line as a mask.

Please add claims 15 and 16:

15. A method for manufacturing a TFT array substrate according to Claim 14 wherein a ITO film is further formed, and through patterning to selectively remove the ITO film, the ITO film on the source line is left to form the ITO film covering the source line.

16. A method for manufacturing a TFT array substrate according to Claim 14 wherein a photoresist on a lower electrode pad at the end of the gate line is removed through a peripheral exposing step in which no mask is used, so that a part of the gate insulating film is removed by etching to expose the lower electrode pad at the end of the gate line.

REMARKS

The above amendments to the claims are made for the purpose of putting the claims into a form which complies with

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requirements of U.S. practice, and to facilitate examination.

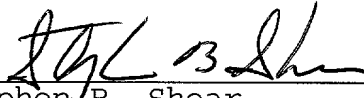
The amendment is in order and its entry is earnestly solicited.

REC'D 445800T

A "Version With Markings to Show Changes Made" is attached
with respect to the amendments to the claims made above.

Respectfully submitted,

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Version With Markings to Show Changes Made

In the claims:

4. (Amended) A method for manufacturing a TFT array substrate [in which at least (a) a gate insulating film, (b) a semiconductor layer and (c) a metal layer are sequentially formed in this order of (a), (b) and (c), and using one resist pattern formed by a photolithography, a part of the metal layer is selectively removed, to form a source line, together with the semiconductor layer beside the source line,

wherein no passivation film is formed after the formation of the source line and the removal of the semiconductor layer beside the source line] according to claim 1 wherein a ITO film is further formed, and through patterning to selectively remove the ITO film, the ITO film on the source line is left to form the ITO film covering the source line.

5. (Amended) A method for manufacturing a TFT array substrate in which as least (a) a gate insulating film, (b) a semiconductor layer and (c) a metal layer are sequentially formed in this order of (a), (b) and (c), and using one resist pattern formed by a photolithography, a part of the metal layer is selectively removed, to form a source line, together with the semiconductor layer beside the source line,

wherein no passivation film is formed after the formation of the source line and the removal of the semiconductor layer beside the source line [so that the source line and the semiconductor layer under the source line remain exposed, and

a portion protruding beside the source line is removed from the exposed semiconductor layer under the source line through etching utilizing the source line as a mask].

6. (Amended) A method for manufacturing a TFT array substrate according to Claim [1, 2, 3, 4 or] 5, wherein [a ITO film is further formed, and through patterning to selectively remove the ITO film, the ITO film on the source line is left to form the ITO film covering the source line] the removal of the semiconductor layer beside the source line is accomplished such that the source line and the semiconductor layer under the source line remain exposed, and

a portion protruding beside the source line is removed from the exposed semiconductor layer under the source line through etching utilizing the source line as a mask.

7. (Amended) A method for manufacturing a TFT array substrate [in which at least (a) a gate insulating film, (b) a first semiconductor layer, (c) a second semiconductor layer and (d) a metal layer are sequentially formed in this order of (a), (b), and (c) and (d), and a resist pattern comprising a region in

which photoresist is removed, a region in which photoresist has a small thickness and a region in which photoresist has a great thickness is further formed by means of a photolithography,

wherein the metal layer, the second semiconductor layer and the first semiconductor layer are removed in the region in which photoresist is removed,

the metal layer and the second semiconductor layer are removed in the region in which photoresist has a small thickness,

and the metal layer, the second semiconductor layer and the first semiconductor layer are left remained in the region in which photoresist has a great thickness to form a source line with the metal layer left remained, and

wherein a region adjacent to the source line is the region in which photoresist has a small thickness, so that the metal layer and the second semiconductor layer are removed and the first semiconductor layer is left remained] according to Claim 5 wherein a ITO film is further formed, and through patterning to selectively remove the ITO film, the ITO film on the source line is left to form the ITO film covering the source line.

8. (Amended) A method for manufacturing a TFT array substrate in which at least (a) a gate insulating film, (b) a first semiconductor layer, (c) a second semiconductor layer and (d) a metal layer are sequentially formed in this order of (a), (b), (c) and (d), and a resist pattern comprising a region in

which photoresist is removed, a region in which photoresist has a small thickness and a region in which photoresist has a great thickness is further formed by means of a photolithography,

wherein the metal layer, the second semiconductor layer and the first semiconductor layer are removed in the region in which photoresist is removed,

the metal layer and the second semiconductor layer are removed in the region in which photoresist has a small thickness,

and the metal layer, the second semiconductor layer and the first semiconductor layer are left remained in the region in which photoresist has a great thickness to form a source line with the metal layer left remained, and

wherein a region adjacent to the source line is the region in which photoresist has a small thickness, so that the metal layer and the second semiconductor layer are removed and the first semiconductor layer is left remained[, and

wherein a passivation film is formed after removal of the photoresist, a resist pattern to selectively remove the passivation film is formed on the passivation film, and using the resist pattern, the passivation film above the source line and the passivation film above the source line and the passivation film beside the source line are removed to, thereby, expose the second and first semiconductor layers under the source line].

9. (Amended) A method for manufacturing a TFT array

substrate according to Claim 8, wherein a [portion protruding beside the source line is removed from the exposed second and first semiconductor layers under the source line through etching utilizing the resist pattern to selectively remove the] passivation film [and/or the source line as a mask] is formed after removal of the photoresist, a resist pattern to selectively remove the passivation film is formed on the passivation film, and using the resist pattern, the passivation film above the source line and the passivation film beside the source line are removed to, thereby, expose the second and first semiconductor layers under the source line.

10. (Amended) A method for manufacturing a TFT array substrate according to Claim 8, wherein a [portion protruding beside the source line is removed from the exposed second and first semiconductor layers under the source line through etching utilizing the selectively removed passivation film and/or the source line as a mask] ITO film is further formed, and through patterning to selectively remove the ITO film, the ITO film on the source line is left to form the ITO film covering the source line.

11. (Amended) A method for manufacturing a TFT array substrate [in which at least (a) a gate insulating film, (b) a first semiconductor layer, (c) a second semiconductor layer and

(d) a metal layer are sequentially formed in this order of (a), (b), (c) and (d), and a resist pattern comprising a region in which photoresist is removed, a region in which photoresist has a small thickness and a region in which photoresist has a great thickness is further formed by means of a photolithography,

wherein the metal layer, the second semiconductor layer and the first semiconductor layer are removed in the region in which photoresist is removed,

the metal layer and the second semiconductor layer are removed in the region in which photoresist has a small thickness,

and the metal layer, the second semiconductor layer and the first semiconductor layer are left remained in the region in which photoresist has a great thickness to form a source line with the metal layer left remained,

wherein a region adjacent to the source line is the region in which photoresist has a small thickness, so that the metal layer and the second semiconductor layer are removed and the first semiconductor layer is left remained, and

wherein no passivation film is formed after removal of the resist pattern] according to claim 9 wherein a portion protruding beside the source line is removed from the exposed second and first semiconductor layers under the source line through etching utilizing the resist pattern to selectively remove the passivation film and/or the source line as a mask.

12. (Amended) A method for manufacturing a TFT array substrate [in which at least (a) a gate insulating film, (b) a first semiconductor layer, (c) a second semiconductor layer and (d) a metal layer are sequentially formed in this order of (a), (b), (c) and (d), and a resist pattern comprising a region in which photoresist is removed, a region in which photoresist has a small thickness and a region in which photoresist has a great thickness is further formed by means of a photolithography,

wherein the metal layer, the second semiconductor layer and the first semiconductor layer are removed in the region in which photoresist is removed,

the metal layer and the second semiconductor layer are removed in the region in which photoresist has a small thickness,

and the metal layer, the second semiconductor layer and the first semiconductor layer are left remained in the region in which photoresist has a great thickness to form a source line with the metal layer left remained,

wherein a region adjacent to the source line is the region in which photoresist has a small thickness, so that the metal layer and the second semiconductor layer are removed and the first semiconductor layer is left remained, and

wherein no passivation film is formed after removal of the resist pattern, and a portion protruding beside the source line is removed from the second and first semiconductor layers under the source line through etching utilizing the source line as a

mask] according to Claim 9 wherein a portion protruding beside the source line is removed from the exposed second and first semiconductor layers under the source line through etching utilizing the selectively removed passivation film and/or the source line as a mask.

13. (Amended) A method for manufacturing a TFT array substrate [according to Claim 7, 8, 9, 10, 11 or 12, wherein a ITO film is further formed, and through patterning to selectively remove the ITO film, the ITO film on the source line is left to form the ITO film covering the source line] in which at least (a) a gate insulating film, (b) a first semiconductor layer, (c) a second semiconductor layer and (d) a metal layer are sequentially formed in this order of (a), (b), (c) and (d), and a resist pattern comprising a region in which photoresist is removed, a region in which photoresist has a small thickness and a region in which photoresist has a great thickness is further formed by means of a photolithography,

wherein the metal layer, the second semiconductor layer and the first semiconductor layer are removed in the region in which photoresist is removed,

the metal layer and the second semiconductor layer are removed in the region in which photoresist has a small thickness,

and the metal layer, the second semiconductor layer and the first semiconductor layer are left remained in the region in

which photoresist has a great thickness to form a source line with the metal layer left remained, ,

wherein a region adjacent to the source line is the region in which photoresist has a small thickness, so that the metal layer and the second semiconductor layer are removed and the first semiconductor layer is left remained, and

wherein no passivation film is formed after removal of the resist pattern.

14. (Amended) A method for manufacturing a TFT array substrate according to Claim [13]12, wherein a [photoresist on a lower electrode pad at the end of the gate line is removed through a peripheral exposing step in which no mask is used, so that a part of the gate insulating film is removed by etching to expose the lower electrode pad at the end of the gate line] portion protruding beside the source line is removed from the second and first semiconductor layers under the source line through etching utilizing the source line as a mask.

Please add the following claims:

15. A method for manufacturing a TFT array substrate according to Claim 14 wherein a ITO film is further formed, and through patterning to selectively remove the ITO film, the ITO film on the source line is left to form the ITO film covering the source line.

16. A method for manufacturing a TFT array substrate according to Claim 14 wherein a photoresist on a lower electrode pad at the end of the gate line is removed through a peripheral exposing step in which no mask is used, so that a part of the gate insulating film is removed by etching to expose the lower electrode pad at the end of the gate line.

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